Preface to Forest Pathology and Plant Health

UNIVERSITÀ DEGLI STUDI DI TORINO

Preface to “Forest Pathology and Plant Health”

Every year, a number of new forest pathosystems are discovered as the result of introduction of alien pathogens, host shifts and jumps, hybridization and recombination among pathogens, etc. Disease outbreaks may also be favored by climate change and forest management. The mechanisms driving the resurgence of native pathogens and the invasion of alien ones need to be better understood in order to draft sustainable control strategies. In this special issue, modeling, population biology, and experimental studies are featured with the aim of providing insights on the epidemiology and invasiveness of emergent forest pathogens by contrasting different scenarios dealing with varying pathogen and host population sizes, evolvable genetics, changing phenotypes and phenologies, landscape fragmentation, occurrence of disturbances, management practices, etc. In summary, this special issue focuses on how variability in hosts, pathogens, or ecology may affect the emergence of new threats to plant species. The three elements: pathogen, host, and environment are the well-known basic elements of the plant disease triangle (PDT). The PDT is as old as the field of modern Plant Pathology, and postulates that any plant disease is the outcome of the interaction between Pathogen, Host, and the Environment. Recently, the need has emerged to study not just how the three elements of the PDT directly influence disease, but to focus on how they indirectly affect one another, consequently modifying the final outcome. Of course, anthropogenic effects need to be thrown into the mix as well.

The special issue includes 14 papers. The first is a mini-review by Garbelotto and Gonthier discussing the need for research focusing on complex interactions and on disturbances. This is followed by a much more exhaustive review on the subject by Cobb and Metz. The next four papers describe how anthropogenic effects (e.g. shorter rotation times in an article by Soularue et al., and stoking levels in a study by Munck et al.), climate change (in an article on the root pathogen *Armillaria* by Kubiak et al.), and environmental or topographic factors (Lione et al.) affect the virulence and the persistence of emerging pathogens. A seventh paper by Panzavolta and colleagues provides an interesting framework to study the correlation between stressful environmental conditions with higher susceptibility of trees to both insects and pathogens. One of the interesting unexpected conclusions of the study is the synergistic (i.e. more than additive) effect of stress in increasing fungal spread by increasing vectoring of pathogens by insects.

The following four papers focus on host variability and disease. Prospero and Cleary provide a well-structured review on the subject focusing on the effects of host variability on invasive pathogens. Ruiz Silva et al. discuss the importance of both genetic and phenological resistance against an important emergent pathogen, while Chieppa et al. experimentally uncover intraspecific competition among pine genotypes cryptically driven by susceptibility to infection by a vascular pathogen. Finally, the paper by De Urbina et al. describes how multiple diseases emerging on the same host may preferentially attack different host populations. The paper also emphasizes through an experimental study how hard it may be to manage these emergent diseases.

The last group of three papers provides solid evidence about the human role in the global movement of pathogens (Mehl et al.), and about additional human roles in enhancing the establishment of invasive exotic pathogens (Danti and Della Rocca, Ploetz et al.). The article by Ploetz et al. on Laurel Wilt also brings to the forefront the complex issue of a disease that affects both agricultural and natural forest settings.

In summary, as Garbelotto and Gonthier conclude in the first paper of the issue: ” This special issue contains 13 [additional] articles that we hope will be thought-provoking in more than one way. They include widely different approaches, scales, and technical methodologies, and they well represent the cutting edge of contemporary Forest Pathology. The expectation of this special issue was to represent a range of approaches currently employed to study variability in tree diseases. We hope the reader will agree that this expectation has been met, and we hope he/she will concur that in the process of compiling this issue, we may have put together an excellent textbook for an advanced class in Forest Pathology”

Matteo Garbelotto and Paolo Gonthier
Special Issue Editors